

VEROMESSOR LOBOGNATHUS: SECOND NOTE (HYMENOPTERA: FORMICIDAE)¹

GEORGE C. WHEELER AND JEANETTE WHEELER

Department of Biology, University of North Dakota

ABSTRACT

Previous reports of this rare ant are three from Colorado, one from Nevada, and a dubious one from Missouri. Three colonies have now been found in North Dakota, in 1954, 1957, and 1958, respectively, all on the steep south-facing wall of the same narrow valley in the Little Missouri Badlands. Two nests were in soil under flat rocks; the third was in soil under and near a grass clump, with a messy, irregular mound of excavated earth among the grass culms. Total populations, includ-

ing all stages and castes, in two colonies counted were 1512 and 637, respectively. This harvester ant was collecting and storing seeds of grasses when studied in June and July. It is not aggressive and seems unable to sting, but its bite is annoying. Its most remarkable characteristic is its thoroughly deceptive resemblance to the common western harvester ant *Pogonomyrmex occidentalis* (Cresson); in fact, it fulfills all the requirements of Wallace's Rules of Batesian Mimicry.

Recently we reported (1956) our discovery in southwestern North Dakota of the rare ant, *Veromessor lobognathus* (Andrews), a putative mimic of *Pogonomyrmex occidentalis* (Cresson). We had collected it unknowingly in the summer of 1954 and found it in our collection in the winter of 1955-56. In the summer of 1956 we revisited the same south-facing slope (figs. 1 and 2) but were unable to relocate the nest, presumably because of drought. The summer of 1957 was a wet season; by the end of June, Roosevelt National Memorial Park had already received 13 inches of precipitation, whereas the annual average is about 16 inches. On June 28, during our first hour afield, we relocated the same rock (fig. 3) and under it found a colony of *V. lobognathus*. We presume it to be the same colony (No. 556) that we sampled in 1954, although we have given it a different field number (2063).

Plants² in the immediate vicinity of the nest were *Eurotia lanata* (Pursh) Moq. (winterfat), *Gaura coccinea* Pursh (gaura), *Stipa comata* Trin. and Rupr. (needle-and-thread grass), *Bouteloua gracilis* (H.B.K.) Lag. (blue grama) and *Agropyron smithii* Rydb. (western wheatgrass). Dominants on the slope are *Artemisia tridentata* Nutt. (big sagebrush), *Muhlenbergia cuspidata* (Torr.) Rydb. (plains muhly), *Bouteloua gracilis* and *Agropyron smithii*. The slope was eroded and much of its surface was bare. The nest was on a 22° slope, above which was a moderately vegetated zone with a 15° slope and above that, a 35° slope with relatively little vegetation.

The nearest nest of *Pogonomyrmex occidentalis* was 18 yards to the northwest and the next nearest 20 yards to the southeast. There were nine nests of this species within a radius of 60 yards of the *Veromessor* nest and most of these were lower on the slope.

*The Second Colony.*³—Up the same valley, 600 yards to the southeast of colony No. 2063, a short deep steep-walled valley enters from the north.

In the floor of this tributary valley an intermittent stream has cut a steep-sided gulley about 4 feet wide and 3 feet deep. On the western brink of this gulley we found our second North Dakota colony (No. 2082). The nest of this colony was *not* under a rock; it was in the soil under and near an isolated clump of grass (*Bouteloua gracilis*). Above the surface among the grass culms was a messy irregular mound of excavated earth. Soil in the vicinity contained numerous rock fragments of assorted sizes, but the mound itself was of earth only. Plants near the nest were *Chrysothamnus graveolens* (Nutt.) Greene (rabbitbrush), *Artemisia tridentata*, and *Rhus trilobata* Nutt. (ill-scented sumac). There were no *Pogonomyrmex occidentalis* nests in this tributary valley.

*The Third Colony.*⁴—On June 13, 1958 we revisited the same valley and, on the same south-facing slope on which we had found our first colony (No. 2063), we found our third colony of *Veromessor lobognathus* (No. 2134). It was located 85 yards farther up the valley and 45 yards higher up the slope (fig. 2). Part of the nest was covered by a flat rock 30" x 18" x 3" (fig. 4), which was inclined at an angle of 45° from the vertical, and which faced southwest, thus receiving a maximum of insolation. There were two entrances under the southeastern edge of the rock near the lower corner. Near the same edge were three exposed entrances leading to

¹This study was aided by a grant from the Louis W. and Maud Hill Foundation. Accepted for publication July 28, 1958.

²Dr. Ralph Dix, Marquette University, inspected the nest area, measured the slope angles and identified many of the plants. Dr. Vera Facey, University of North Dakota, identified the remainder from pressed specimens.

³Locality: Billings County, North Dakota, sec. 12, T. 140 N., R. 102 W., Roosevelt National Memorial Park, 4 miles north-northeast of Medora, July 1, 1957.

⁴Locality: Billings County, North Dakota, sec. 12, T. 140 N., R. 102 W., Roosevelt National Memorial Park, 4 miles north-northeast of Medora, June 13, 1958.

chambers under bare soil. Also, near the lower edge of the rock, three separate holes and an eleven-inch crack were used as entrances to chambers under bare soil. Around all the entrances there were a few scattered particles of soil but nothing to suggest a mound. A few plants⁵ of *Oryzopsis hymenoides* (Roem. and

and sexual forms were also present under the caked dried soil beside the rock.

Nest Structure.—For nest No. 2063 crevices under the southeast edge of the covering rock served as entrances. Immediately under the rock were numerous chambers of well packed soil; seeds were more abundant in the chambers



FIG. 1.—Looking west toward the Little Missouri River from the upper end of the tributary valley in which the three North Dakota nests of *Veromessor lobognathus* were found. The south-facing slope is on the right.

Schult.) Ricker (Indian ricegrass), *Chrysothamnus graveolens*, *Sphaeralcea coccinea* (Nutt.) Rydb. (red mallow), *Agropyron spicatum* (Pursh) Scribn. and Smith (bluebunch wheatgrass), *Gaura coccinea*, and *Eurotia lanata* were near the nest but most of the surrounding soil was bare. Several dead stems of *Salsola kali* L. (Russian thistle)



FIG. 2.—South-facing slope showing the positions of nest No. 2063 (to the left) and No. 2134 (on the right) as indicated by arrows. The wall rises about 300 feet above the floor.

were near the entrances at the base of the rock. The nearest *Pogonomyrmex occidentalis* nest was 20 yards to the west and at about the same elevation.

When we lifted the rock, numerous chambers were exposed. The chambers covered by the upper half of the rock contained seeds and mixed brood of all ages. Winged males and females scurried into hiding in lower chambers. Brood



FIG. 3.—Rock under which nest of *Veromessor lobognathus* (No. 2063) was found. The trowel handle is 4 inches long.

under the upper (i. e., higher up the slope) half and ants were more abundant in the chambers under the moister lower half. From the surface to a depth of one inch there were few ants and little brood, but seed-chambers were present. Between 1 and 2 inches we found few ants, no



FIG. 4.—Nest of No. 2134. The 3" X 5" card is on a stake at the left end of the basal edge of the covering rock. Four white tabs at the right and one on the left point to entrances of chambers under bare soil. Entrances to the chambers under the rock are concealed in the dark shadow formed by the overhanging right-hand edge of the rock.

brood and only a few seeds. At the 2-inch level we exposed many large chambers containing many workers. At the 3-inch level there were several large chambers, one of which contained

⁵Robert Ralston, Ranger Naturalist, Roosevelt National Memorial Park, identified the plants.



FIG. 5.—Chambers immediately under the rock of nest No. 2063. The trowel handle is 4 inches long.

workers and larvae. The queen was in a chamber between 4 and 5 inches deep. Between 5 and 6 inches were a few workers. Just below the 6-inch level we found one chamber containing *Stipa* seeds. Below 6 inches we found no chambers.

When we opened nest No. 2082 on July 1 we found chambers under an area 18 inches in diameter and to a depth of 5 inches. On July 2, after a heavy rain the previous night, we found two adjacent craters 2 and 3 inches in diameter. When we re-excavated the nest we found large larvae in a chamber about $1\frac{1}{2}$ inches deep; minute larvae and seeds were in a chamber 10 inches deep. On July 3 we found a new crater about 3 inches in diameter on the western edge of our previous excavations. Pupae were present at $2\frac{1}{2}$ inches and deeper; larvae were present in chambers between 4 and 9 inches deep. We found the queen in a chamber 7 inches deep. Seeds were in the lowest chamber, i.e., 9 inches deep.

The nest of No. 2134 was not excavated, because we did not wish to risk damaging the only known living colony in North Dakota.

To date there are seven reliable records for *V. lobognathus*: one in Nevada, three in Colorado and three in North Dakota. Nest data are available for five of these. The nest found by Cole in Nevada was under a small pebble mound; that found by Gregg in Colorado was under a rock. There was no information about the other two Colorado nests. (See Gregg, 1955). Two of our North Dakota nests were under rocks and one under an earthen mound. In summary:

three nests have been found under rocks, one under a small pebble mound and one under a small earthen mound.

Population.—In 1957 we anesthetized colony No. 2063 lightly with chloroform and collected the entire population. Half the colony was returned to the nest-site in the hope that it would survive. But in 1958 we found no *Veromessor* under the rock, which suggests that this method is not satisfactory. We preserved the entire colony of the second nest (No. 2082). The total counts for each colony are recorded in the following table.

Harvesting.—At colony No. 2063 we watched workers bringing home seeds of *Stipa comata* and *Oryzopsis hymenoides*; seeds of both grasses were stored in the nest (July 10, 1957). We saw workers carrying only *Oryzopsis hymenoides* at colony No. 2082; seeds of both grasses, however, were in storage (July 1–3, 1957). We found seeds of only *Oryzopsis hymenoides* in the superficial chambers of nest No. 2134 (June 13, 1958). At no time did we see lines of foraging workers.

Behavior.—According to our scattered observations, activity outside the nest was greatly reduced around noon (11 a.m. to 12:30 p.m.) on hot (85° F. and above) sunny days. On a cloudy cool day about two dozen foragers were out at 11 a.m. On sunny days we saw about the same number at 9 a.m. (78° F.), at 5:45 p.m. (83° F.) and at 8 p.m. (60° F.). The workers did not move rapidly at any time.

When the nest was disturbed the workers were not especially aggressive and their defense did

not seem particularly effective. They would, however, bite readily and hold on tenaciously. One worker held on to the tender surface of a forearm for 10 minutes. It performed the usual motions of stinging but produced no sensation; apparently the sting did not even enter the skin. The bite, however, was painful for 30 minutes.

	Colony 2063	Colony 2082
Eggs.....	111	
Larvae.....	389	15
Semipupae.....	54	
Pupae..... ♀	24	
♂	73	28
♀	20	30
Imagines..... ♀	627	533
♂	149	28
winged ♀	55	2
wingless ♀	10	1
Total.....	1512	637

Mimicry.—We have already referred (1956) to the remarkable resemblance of *Veromessor lobognathus* to *Pogonomyrmex occidentalis*. We can

think of no case among ants where the superficial similarity of unrelated species is so close. To be sure they can be distinguished easily with the unaided eye if examined closely in profile; and the nests are utterly different. But the similarities of color, size, habitus, locomotion and harvesting habit are extremely deceptive.

Gregg (1955) has mentioned the possibility of mimicry and, although we do not have enough information to warrant a conclusion, we would like to point out how closely this case fulfills the requirements of Wallace's Rules of Batesian Mimicry:—

1. Both species occur in the same area and occupy the same station.

2. *V. lobognathus* apparently cannot sting, whereas *P. occidentalis* has the most vicious sting of any ant in this area.

3. *P. occidentalis* is one of the most abundant ants in the area; *V. lobognathus* is one of the rarest.

4. *V. lobognathus* differs superficially from its congeners.

5. The resemblances between *V. lobognathus* and *P. occidentalis* are superficial only and do not affect generic characters.

REFERENCES CITED

- Gregg, R. E. 1955. The rediscovery of *Veromessor lobognathus* (Andrews) (Hymenoptera: Formicidae). *Psyche* 62: 45-52.
- Wheeler, G. C., and J. Wheeler. 1956. *Veromessor lobognathus* in North Dakota (Hymenoptera: Formicidae). *Psyche* 63: 140-5, 2 figs.